

Math 112
LQuiz 02

2022-01-13 (R)

Your name: _____

Exercise

Use properties of exponents and logarithms to compute the following. (The answers are integers.)

(a) Let

$$e^a = \frac{2}{3}$$

$$e^b = 3$$

$$e^c = \frac{5}{6}$$

Compute

$$e^{2a+3b-13c} \cdot \frac{e^{10a+7c}}{e^{10a-7c}}$$

Solution: We compute

$$\begin{aligned} e^{2a+3b-13c} \cdot \frac{e^{10a+7c}}{e^{10a-7c}} &= e^{2a} e^{3b} e^{-13c} \cdot e^{10a} e^{7c} \cdot e^{-10a} e^{-(-7c)} \\ &= e^{2a+10a-10a} e^{3b} e^{-13c+7c+7c} \\ &= e^{2a} e^{3b} e^c \\ &= (e^a)^2 (e^b)^3 e^c \\ &= \frac{2^2}{3^2} \cdot 3^3 \cdot \frac{5}{6} \\ &= 10 \end{aligned}$$

(b) Let

$$\ln a = 2$$

$$\ln b = -10$$

$$\ln c = \pi$$

Compute

$$\ln \left(\frac{a^5}{b^{-3}c^{12}} \right) - \ln \left(\frac{b^4}{(c^6)^2} \right)$$

Solution: We compute

$$\begin{aligned} \ln \left(\frac{a^5}{b^{-3}c^{12}} \right) - \ln \left(\frac{b^4}{(c^6)^2} \right) &= \ln a^5 - (\ln b^{-3} + \ln c^{12}) - (\ln b^4 - \ln c^{12}) \\ &= 5 \ln a + 3 \ln b - 12 \ln c - 4 \ln b + 12 \ln c \\ &= 5 \ln a - \ln b \\ &= 5(2) - (-10) \\ &= 20 \end{aligned}$$